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Detection of Standing Estrus in Cattle

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DETECTION OF STANDING ESTRUS IN CATTLE

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Detecting standing estrus ("heat detection" or "detecting standing heat") is simply looking for the changes in animal behavior that are associated with a cow/heifer standing to be mounted by a bull or another female. Detecting animals in standing estrus is critical to the success of any artificial insemination program. Animals not in estrus around the time of insemination have little chance of becoming pregnant.

Estrous-detection aids or estrous synchronization protocols can greatly increase the likelihood of detecting cows in standing estrus.

Importance of estrous detection

At Colorado State University, animals were administered an estrous synchronization protocol and then monitored for standing estrus 24 hours a day or twice a day for 30 minutes.

By day 5 after estrous synchronization, 95% of animals monitored 24 hours a day were detected in standing estrus, while only 56% of animals observed twice a day for 30 minutes were detected in standing estrus.

With a 95% estrous detection rate and a 70% conception rate (95% x 70% = 67%), 67% of the animals will be pregnant, whereas at a 55% estrous detection rate only 39% (55% x 70% = 39%) of the cows will be pregnant (Table 1). For a successful artificial insemination program, you need to achieve a high percentage of pregnancy, and that requires good estrous detection.

Table 1. Effect of estrous detection rate on increasing pregnancy rate.

Estrous Detection Rate	55%	60%	65%	70%	75%	80%	85%	90%	95%
Conception Rate	70%	70%	70%	70%	70%	70%	70%	70%	70%
Pregnancy Rate	39%	42%	46%	49%	53%	56%	60%	63%	67%

Figure 1. Standing to be mounted by a bull or another cow is the only conclusive sign that a cow is in standing estrus and ready to be bred.

Standing estrus

Standing estrus (the sexually receptive period) results from a series of hormonal changes that occur at the end of each estrous cycle. Standing estrus is when a cow/heifer stands to be mounted

by a bull or a female. In a normally cycling animal, standing estrus will occur approximately every 21 days, but this can range from 17 to 24 days.

Cows enter standing estrus gradually; secondary signs that an animal is getting close to standing estrus will progress until the animal stands to be mounted. **None of these secondary signs alone is a positive determination of standing estrus. Standing to be mounted by a bull or another cow/heifer is the only conclusive sign that an animal is in standing estrus and ready to be inseminated.** The period of standing estrus usually lasts about 15 hours but can range from less than 6 hours to close to 24 hours.

To maximize detection of standing estrus, it is extremely important to monitor cows/heifers as closely as possible—early in the morning and late at night as well as during the middle of the day. Continuous observation of over 500 animals in three separate studies indicated that 55.9% of cows initiated standing estrus from 6 p.m. to 6 a.m. (Table 2).

When cows were checked for standing estrus every 6 hours (6 a.m., noon, 6 p.m., and midnight), the estrous detection rate increased by 19% compared to checking at 6 a.m. and 6 p.m. alone. Checking for standing estrus at 6 a.m., noon, and 6 p.m. increased the estrous detection rate by 10% compared to detecting estrus at 6 a.m. and 6 p.m. alone.

Table 2. Time of day when cows exhibit standing estrus.

Time of day	Percentage of cows exhibiting standing estrus
6 a.m. to 12 noon	26.0 %
12 noon to 6PM	18.1 %
6 p.m. to midnight	26.9 %
Midnight to 6AM	29.0 %

Data adapted from Hurnik and King, Xu et al., and G.A. Perry.

Secondary signs of standing estrus

Because it is difficult to monitor animals 24 hours a day, you can check for secondary signs of standing estrus.

Secondary signs can indicate that a cow is approaching standing estrus, and that she should be monitored closely over the next 48 hours. Or secondary signs may indicate she has recently been in standing estrus and should be monitored closely again in 17 to 25 days (Fig 2).

Secondary signs can be very helpful, but used alone they do not allow for a confident determination of standing estrus.

• **Congregating.** Cattle that are in standing estrus naturally seek out other animals in estrus and form a small group, referred to as the sexually active group. They make physical contact with each other, standing head to tail, circling, butting heads, and resting their chins on the back or hip of other cows/heifers.

Whenever a small group of animals gathers together, it should be watched closely for animals in standing estrus.

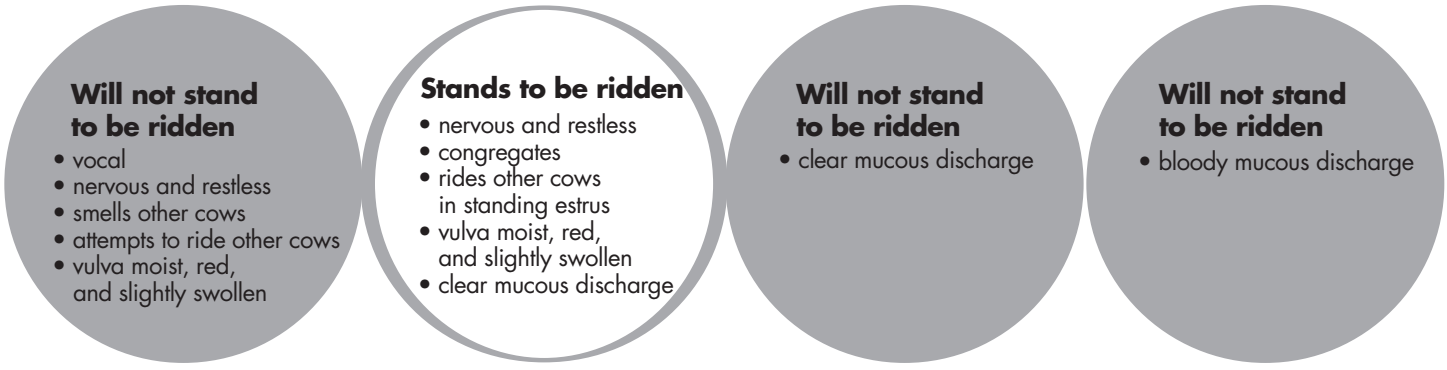
• **Mounting other animals.** Animals in standing estrus or approaching this stage will usually try to mount other animals.

Figure 3. A chin-ball marker, which works like a ball point pen, is worn under the chin of a marker animal and marks the animals that are mounted.

Only the cow/heifer that stands to be mounted is actually in standing estrus (Fig 1). The cow that is doing the riding may or may not be in standing estrus. A cow/heifer that mounts another animal a few times and then leaves the sexually active group is likely not in standing estrus, but an animal that consistently mounts other animals may be and thus requires further observation.

• **Clear mucus from vagina.** Estrogen causes thick, clear mucus to be released from within the cow's cervix. When a cow or heifer mounts another animal, stands to be ridden, or when the reproductive tract is stimulated during artificial insemination (AI), mucus may be expelled from the vulva. Strings of mucus hanging from the vulva or smeared on the tail and buttocks are a good sign that the cow/heifer is in or approaching standing estrus.

Figure 2. Signs to look for before, during, and after standing estrus.



• **Nervousness or restlessness.** This may be excessive walking and bawling. Watch for any animal that is moving when other animals are relatively stationary. She might be walking a fence line in search of a bull.

• **Roughed up tailhead.** Normally, the hair on the tailhead lies down and points toward the tail, but the hair on the tailhead of an animal that has been ridden may be roughed up to the point where it sticks almost straight up. A cow/heifer that has been ridden hard may sometimes have the hair rubbed off of her tailhead.

In muddy areas, mud will often be plastered on both flanks and sometimes up along the back and ribs.

However, be careful when using roughed up hair or mud as an indicator of standing estrus. **Both** sides of the animal must show signs of being ridden, since an animal cannot be ridden and marked on only one side.

• **Swollen vulva.** A moist, red, and swollen vulva is often associated with standing estrus. However, this can be difficult to determine and may be of limited value.

• **Bloody mucus from vagina.** Two to 3 days after standing estrus a bloody discharge from the vulva may be observed. This is normal and only means that the animal was in standing estrus earlier. It is too late to inseminate the animal, but it is an indicator that she should be monitored for standing estrus in 17 to 21 days.

Estrous detection aids

It is a tremendous task to detect standing estrus in a cow herd, and nothing can substitute for visually observing the cattle. Several estrous-detection aids are commercially available, but **these are just aids**. The more time spent with the cattle looking for standing estrus, the better.

• **Marker animals**. One of the most effective aids for detecting standing estrus is a marker or teaser animal. Marker animals can be bulls which have been surgically altered or androgenized cows. Surgical alteration of bulls inhibits them from inseminating but allows them to remain sexually active. Several types of surgical alterations can be performed: vasectomy, epididymectomy, penile deviation, and others. Androgenized cows are usually cull cows that have been injected with testosterone to stimulate male behavior.

Marker animals are usually equipped with some form of a marking device. The most common is the chin-ball marker (Fig 3). This device is worn on a halter under the marker animal's chin and works much like a ball-point pen. When an animal in standing estrus is mounted by the marker animal, the chin-ball marker will rub against the animal in standing estrus, leaving marks on her back and rump. You must learn to interpret these marks, since marks can also be left when the marker animal rubs its chin on animals.

• **Mounting-activity detectors**. Several commercial mounting-activity detectors are available that attach to the rump of the cow/heifer and rub off, change color, light up, or send a signal to a computer when pressure is exerted on them. Most of these devices require minimal time and labor to apply When they are used, a marker animal is not required (Fig 4).

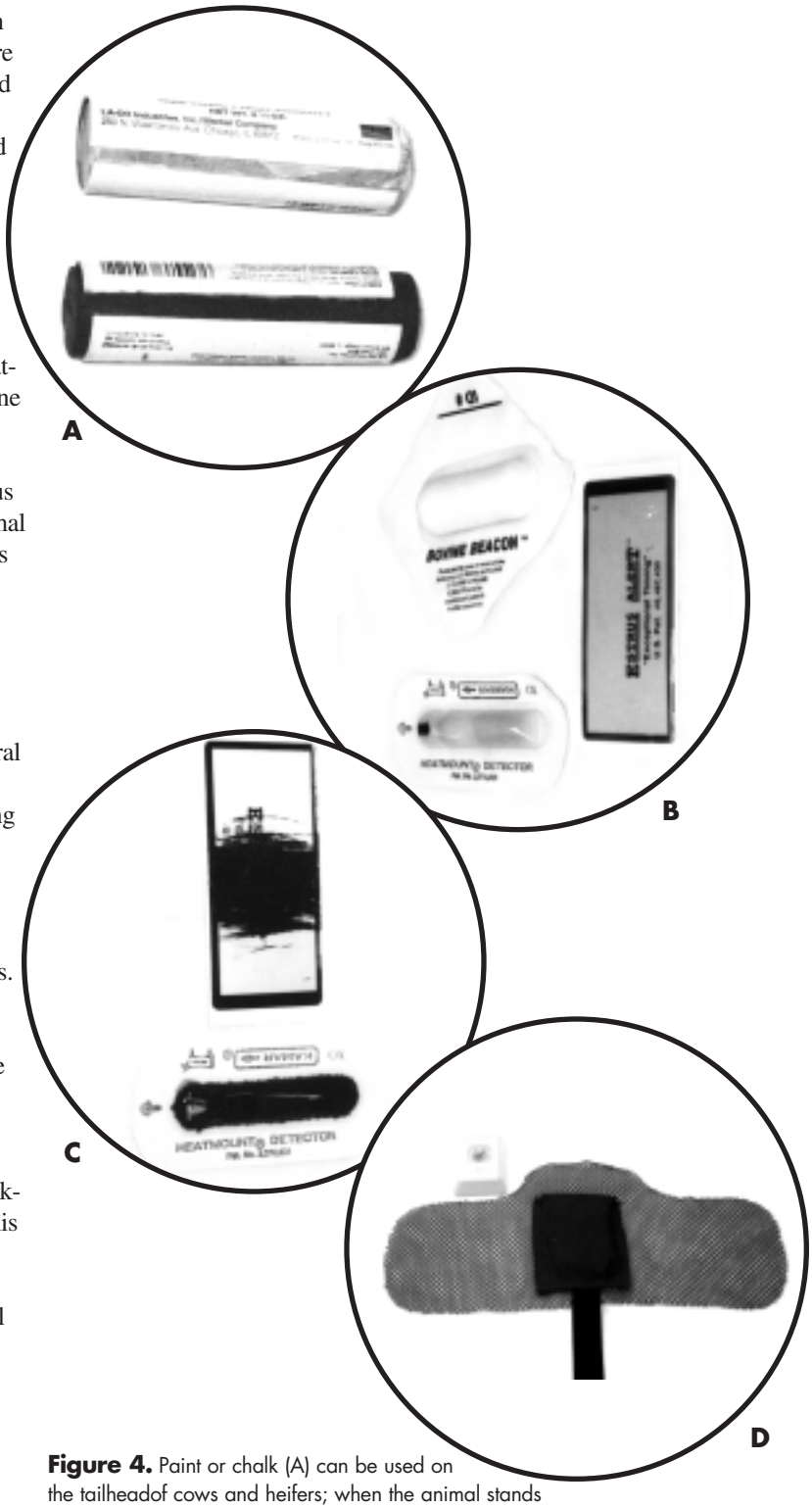


Figure 4. Paint or chalk (A) can be used on the tailheadof cows and heifers; when the animal stands to be ridden the paint or chalk is rubbed off. Other commercially available mounting activity detectors (B) can be attached to the tailhead of the animal; whe the animal is in standing estrus the detector will change colors (C). Electronic mounting activity detectors (D) fit into a patch placed on the animal's tailhead; when the animal is in standing estrus, the detector will send a radio signal to a computer that records the time and duration of each mount.

Tail marking is an inexpensive method. Chalk or paint is placed in a band along the animal's tailhead from hooks to pins (Fig 5). When an animal stands to be mounted, the chalk or paint is rubbed off by the animal doing the mounting.

Just as when you use a roughed up tailhead as a sign of standing estrus, take care to determine that the chalk or paint is removed by mounting activity and not by the rubbing or licking of a curious animal.

Several commercially available mounting activity detectors change color as an animal is ridden. These devices are placed on the animal's tailhead and are activated when she stands to be mounted (Fig 6). One device is a **capsule embedded on a fabric patch**; with prolonged pressure a dye is released or a chemical reaction occurs that causes the capsule to change color.

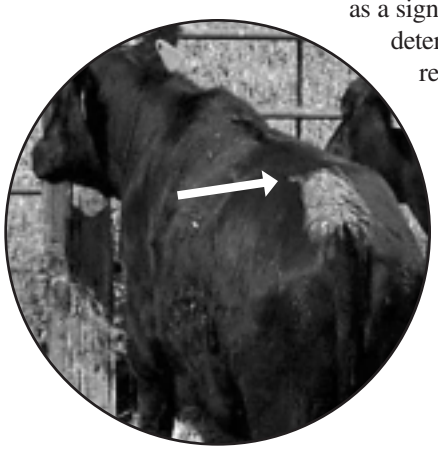


Figure 5. Chalk is placed on the animal's tailhead from hooks to pins. The chalk is rubbed off when an animal stands to be mounted.

Figure 6. Commercially available mounting-activity detectors are placed on the animal's tailhead and are activated when the animal stands to be mounted.

A second device is a **colored patch covered with a scratch-off surface**; as the animal is mounted the surface is scratched off, exposing the color. Results can be very good when using these devices in combination with visual detection, but be sure the device is properly attached to the hair of the animal. It could be scraped off or activated by low branches, brush, or fences.

The newest type of mounting-activity detector is an **electronic detector**. It will likely be the most expensive but can add accuracy to detection of standing estrus. These aids contain a pressure-sensitive battery-powered patch that mounts to the tailhead of the animal (Fig 7). When pressure is applied a light is activated, indicating the animal has been mounted, or a radio signal is sent to a receiver. A computer connected to the receiver records the animal, time of the mount, and duration of the mount.

Electronic detectors increase the accuracy of detecting standing estrus, because instead of being activated by a single mount, they will record multiple mounts and possibly the time of each mount.

• **Recordkeeping**. Good recordkeeping is an essential part of good herd management and is a very economical method in aiding estrous detection. By accurately recording the animal number, dates in standing estrus, and dates inseminated (naturally or artificially), you can anticipate the next standing estrus for each individual. Furthermore, good recordkeeping makes it possible to know when animals are bred and to which bull, allowing for better overall herd management.

Conclusion

Several aids are available to help in detecting standing estrus, but nothing substitutes for visual observation. The more frequent the observation, the greater the likelihood of detecting animals in standing estrus.

Estrous detection and your ability to recognize the secondary signs associated with standing estrus are gained through experience. A good understanding of these signs combined with visual observation of the animals during the artificial insemination period will greatly improve the likelihood of a successful breeding season.

For further reading

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Figure 7. Electronic detectors mount to the tailhead of an animal and send a radio signal to a computer.

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